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PHOTOMICROSCOPE

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CARL ZEISS

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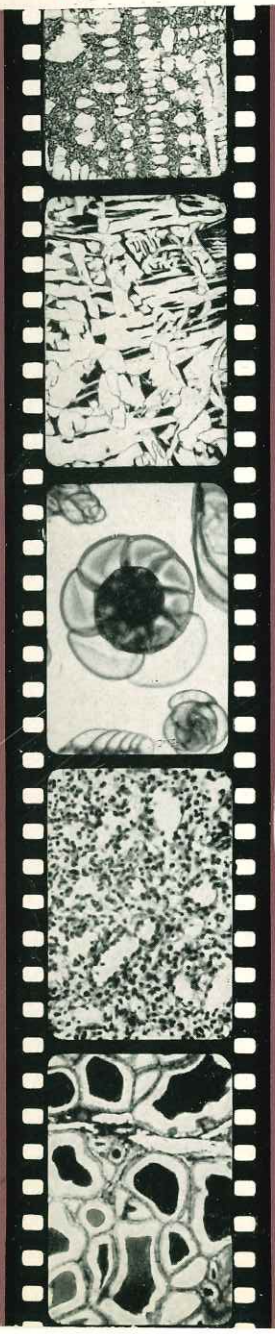

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Fig. 1: ZEISS PHOTOMICROSCOPE

For more than a century ZEISS have constructed Microscopes – the continuous development of which has been placed on a scientific basis, mainly through the exact optical computations by Professor Ernst Abbe. In the cultivation of this tradition we are facing a great task.

Our new Microscopes with built-in automatic camera have met with full approval wherever they were put to a practical test. In this we feel encouraged to carry on what has hitherto been achieved.

Our instruments shall enable the operator to fully concentrate on the examination of the specimens and to photograph the microscopic image in a simple way for its future evaluation.

THE ZEISS PHOTOMICROSCOPE

offers the possibility to fix the focused microscopic image on the miniature film by merely pressing a button. What seemed to be impossible yesterday, has become reality today. There is nothing that tends to distract the operator, he need neither bother himself with the time of exposure, nor the changing of plates or the transport of the film; he may concentrate on his microscopic study and at the same time take photographs, a dual activity that may be referred to as "micrographing".

The user will be surprised by the simple operation of the instrument; all operating knobs are clearly arranged and are easily accessible. As soon as the specimen is focused in the eyepiece, the action of pressing a button results in the following operations:

Opening of the shutter
Automatic setting of time exposure
Closing of the shutter after exposure
Transporting the film by one picture length
Actuating a film counter
Re-cocking of the shutter.

A spring device which is only wound up when inserting the film takes care of the shutter operation and the film transport.

The Photomicroscope can be used for as many purposes as any large universal microscope. It is suited for microscopy and photomicrography with trans- and epi-illumination as well as for work with polarized light. Supplied as a special make it may be used as a large polarizing microscope equipped for measurements and special work with a universal rotary stage (see leaflet 40 – 550). In all these cases, the usual methods of examination, such as bright field, dark field and phase contrast, may be applied.

The possibility of taking a series of properly exposed photographs in rapid succession – by adhering strictly to instructions – represents an advantage that renders the Photomicroscope especially suitable for the worktable of the research worker who will always have to take photographs of a great number of findings. Thus, he is offered a microscopic "sketchbook" that immediately records each observation true to nature.

THE MICROSCOPE

The essential parts of the Microscope can be removed and easily replaced, as for instance the stage, the condenser, the revolver with its objectives and the eyepiece tube. For convenient operation the drive knobs are low and coaxially arranged. A round, rotary and centering mechanical stage (see Fig. 1, p. 2) being

Fig. 2: ZEISS PHOTOMICROSCOPE, equipment for work with trans-illumination

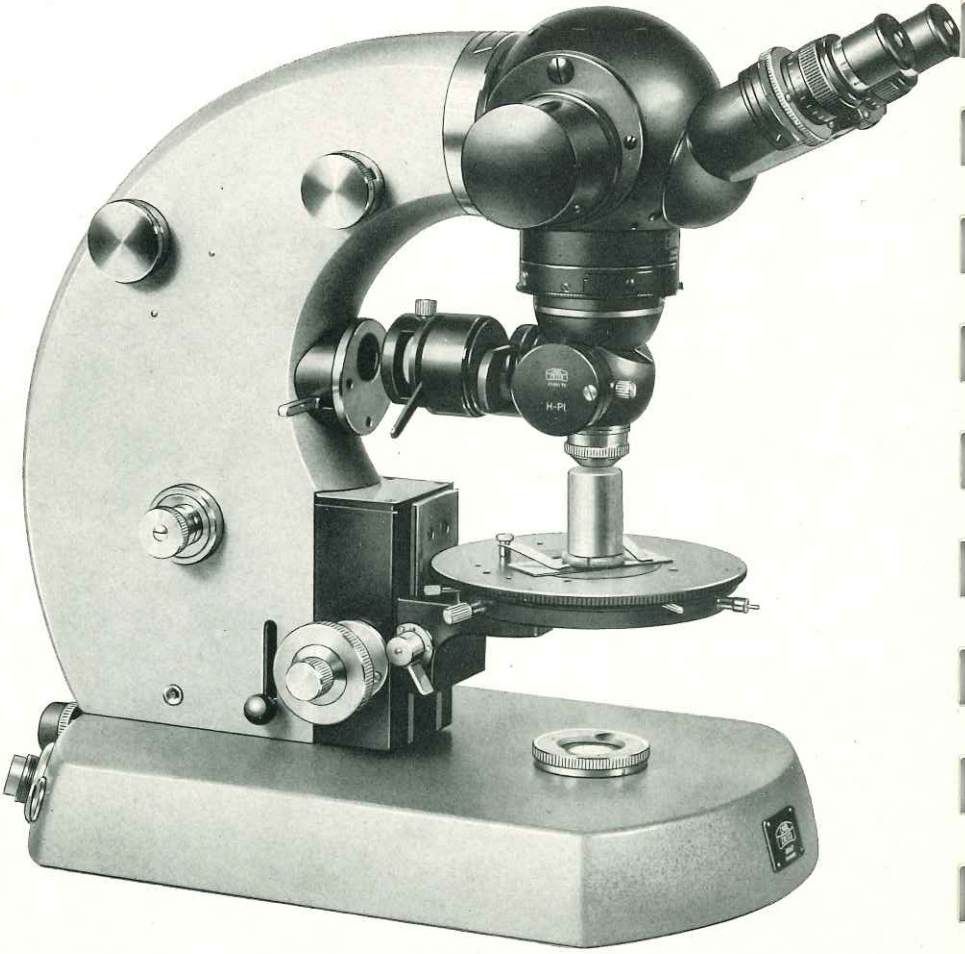


Fig. 3: ZEISS PHOTOMICROSCOPE, equipment for work with epi-illumination

of special advantage for photomicrography serves as specimen stage; this stage can easily be exchanged against other specimen stages, e. g. against a sliding stage for finest, but also rapid specimen displacements by hand (see Fig. 2, p. 5).

For observation serves a binocular inclined tube which renders uniform vision. Thus, even extended microscopic working is not felt as a strain.

The instrument is equipped with a built-in OPTOVAR for changing the eyepiece magnification. Moreover, the image scale may also be altered by changing the projective so that the following image scales are obtained in the second magnification stage:

Projective	Optovar		
	x 1.25	x 1.6	x 2
6.3 : 1	4 : 1	5 : 1	6.3 : 1
3.2 : 1	8 : 1	10 : 1	12.5 : 1

If only microscopic work has to be performed, the light is immediately directed from the OPTOVAR into the tube. When taking photographs another system of prisms is inserted by means of a slide which directs the path of rays (see Figs. 4 and 5) first to the camera and then into the tube.

THE CAMERA

The Photomicroscope is equipped with a completely automatic camera which is organically integrated into the Microscope. The film is placed in a removable drum-shaped magazine which is inserted from the right into the body of the stand. By a slight rotation it is bolted, simultaneously coupled with the mechanism and also opened. The usual daylight cartridges may be used. When disengaging the bolting device, the magazine is closed. The film may be reeled back and removed in daylight. If two magazines are available one may be charged with a black-and-white film, while the other is charged with a color film. Thus, it is possible to take consecutively – after changing the magazines – black-and-white or color photographs. At any rate with exact focusing an even, properly exposed film strip is obtained. But in order not to be completely dependent on the automatic setting of the time of exposure, e.g. when taking dark-field photographs, a manual release knob is affixed to its side permitting to expose the film at one's option or $1/8$, $1/15$, $1/30$ and $1/60$ second.

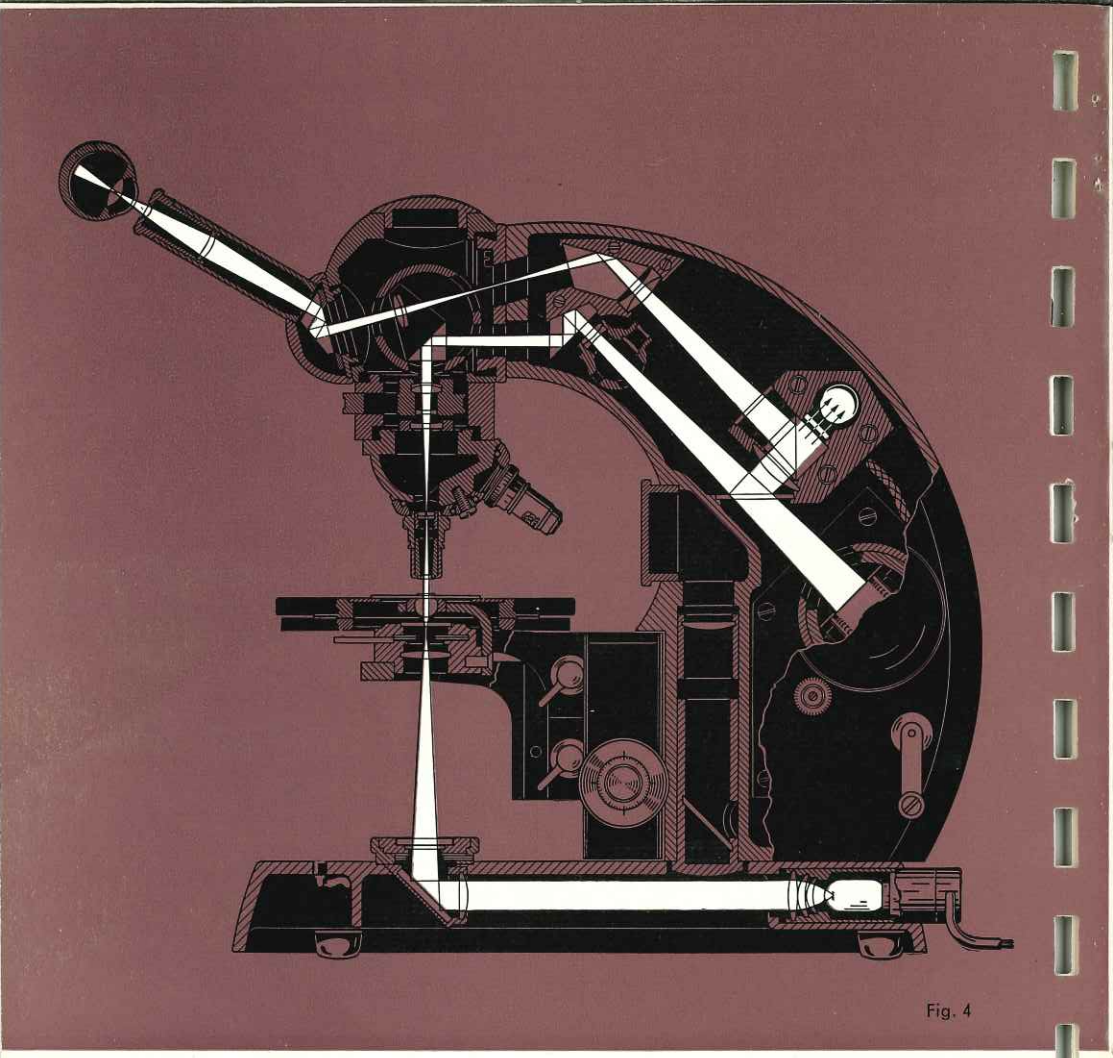


Fig. 4

PATH OF RAYS WITH TRANS-ILLUMINATION

From the base of the Microscope the light is directed through the condenser to the specimen. Above the objective the magnification changer OPTOVAR is arranged. When taking photographs (see illustration) the light is conducted via deviating prisms and through the switchable projective to a plane plate. Part of the light is directed to the film, the remainder to the photoelectric cell and through a graduated dial into the observation eyepiece.

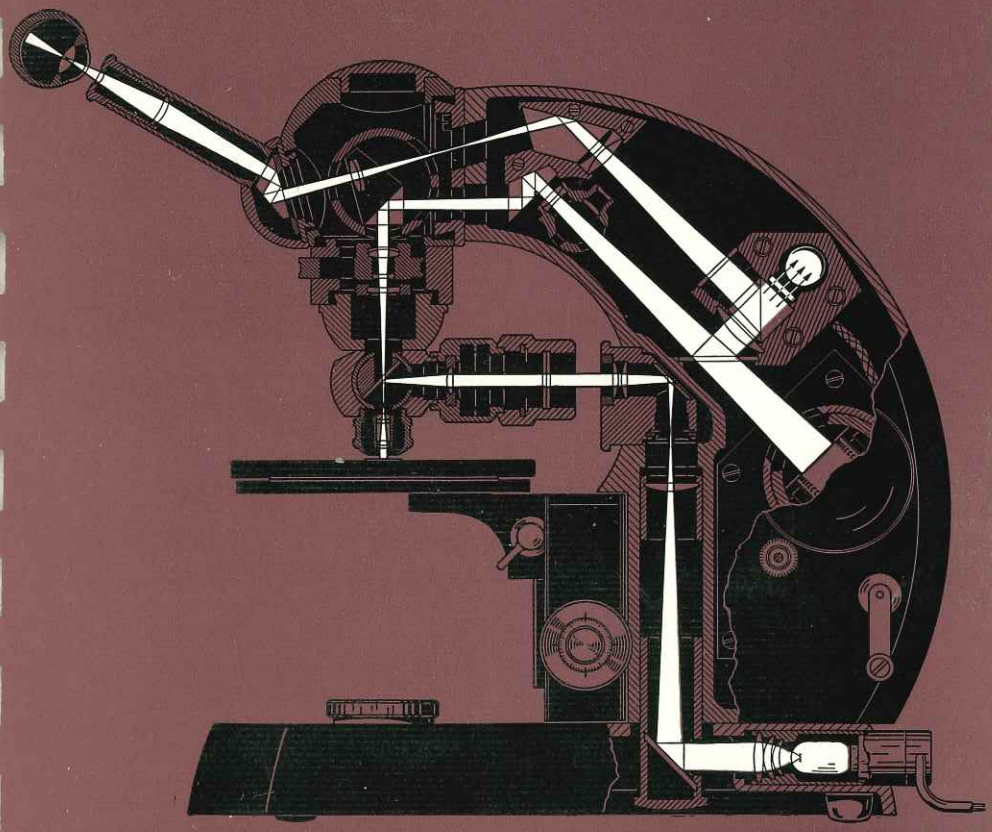


Fig. 5

PATH OF RAYS WITH EPI-ILLUMINATION

The light of the low-voltage lamp is directed via a deviating mirror into the mirror inset with the aperture diaphragm and from there into the epi-illumination condenser. Above the objective a reflector is arranged. Here, the light is conducted into the objective and to the specimen. As it is the case with the path of rays with trans-illumination, the light reflected from the specimen is directed to the film plane (see illustration) – when taking photographs – and into the observation eyepiece.

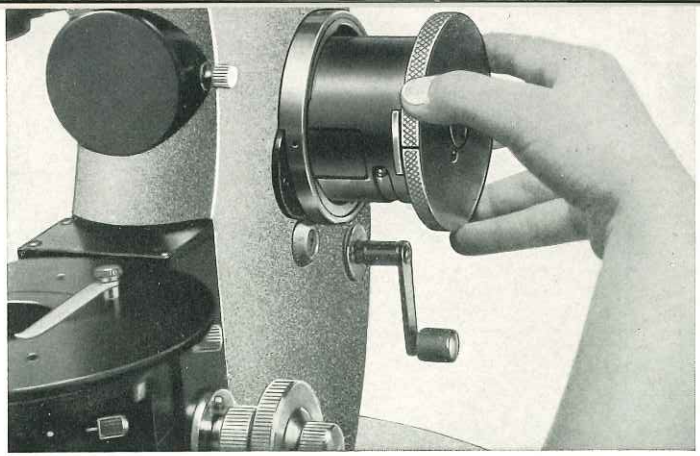


Fig. 6: The drum-shaped magazine is removed from the PHOTOMICROSCOPE

THE OPTICAL SYSTEM

The same optical equipment is used for observation and for taking photographs. For work with trans-illumination we recommend our Planachromats or Planapochromats and for work with epi-illumination our new EPIPLAN objectives. Plane objectives render a completely flattened picture and hence are particularly suitable for photomicrographic purposes.

It is sufficient to equip the tube with a pair of eyepieces, since a change of the eyepiece magnification can be effected by means of the OPTOVAR. When taking photographs, an additional possibility is offered by making use of the projective.

THE ILLUMINATION

The illumination arrangement of the PHOTOMICROSCOPE is well demonstrated in Figs. 4 and 5. In the base of the instrument the reliable low-voltage lamp (6 V 15 W) of high intensity is rigidly built in, emitting sufficient luminosity for the usual examinations and photomicrographic work. For observation with trans-illumination the light may be directed through a collector into the Microscope, or for observations with epi-illumination – after engaging the deviating mirror – it may be directed into the epi-condenser which may be attached to the lower end of the tube head instead of the objective revolver. In any case – both with trans- and epi-illumination observation – the light source is imaged in the aperture diaphragm and thus renders a limitation of radiation according to Koehler's principles.

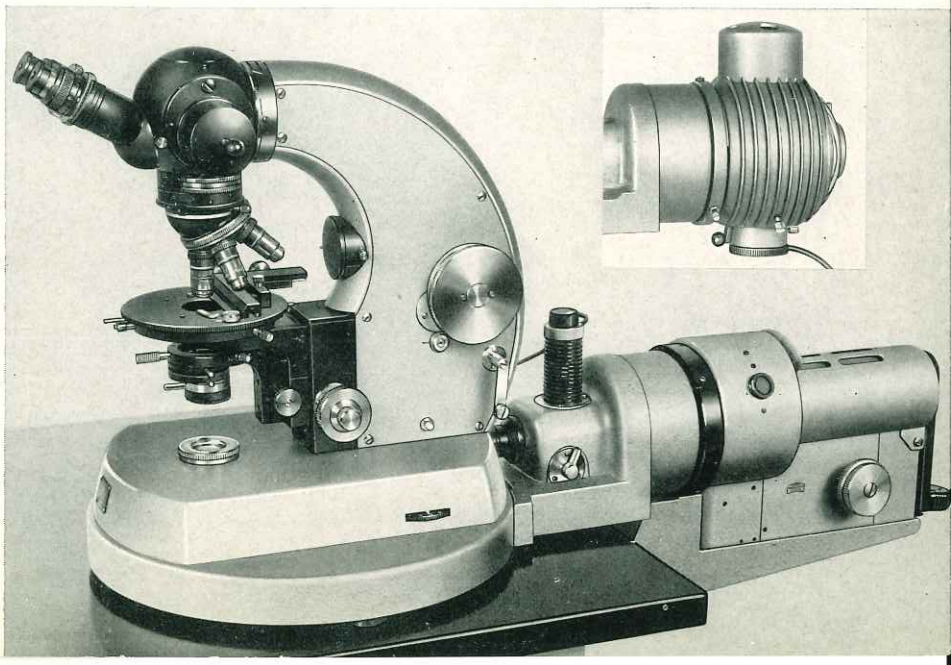
SPECIAL ILLUMINATION

Inasmuch as special tasks require stronger light sources for working, instead of the built-in low-voltage lamp an illumination attachment is supplied which may be equipped with various lamps.

This does not affect the path of rays within the instrument. At any rate the illumination attachment is equipped with a low-voltage lamp 6 V 15 W, the light of which is directed via a mirror into the instrument; after having switched the mirror, the light of a carbon arc lamp or of another light source, e. g. of a super-pressure mercury lamp, is directed into the instrument just as required. The operation of the carbon arc lamp is extremely simple, because it is equipped with an automatic carbon feed. Due to the spectral composition of the arc light, it is still the most suitable light source of high intensity (18,000 stilb with D. C. mains connection) for photomicrographic purposes – especially for taking color photographs.

Besides the Photomicroscope the large Camera Microscope ULTRAPHOT II with an extraordinarily wide range of application is available, being primarily equipped for working with plates (9 x 12 cm). This instrument – among other possibilities – may also be equipped for taking photographs with low magnification (survey photographs) and for micro-projection.
Please send for leaflet 40 – 451.

Fig. 7: ZEISS PHOTOMICROSCOPE with special illumination
below: with attached arc lamp
above: with attached high-performance lamp for projection lamps or for super-pressure mercury lamp



The illustrations are not binding in all details for the construction of the instruments.

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